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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 HANFORD PROJECT OFFICE
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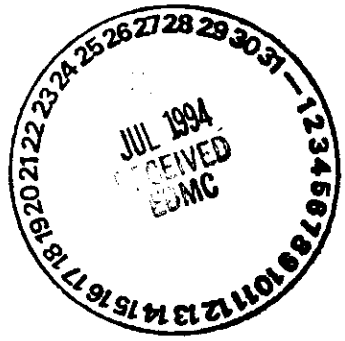

July, 21, 1994

Glenn Goldberg
U.S. Department of Energy
P.O. Box 550, MS A5-19
Richland, Washington 99352

Re: White Bluffs Pickling Acid Crib RI/FS Review

Dear Mr. Goldberg:

Enclosed are the comments from the U.S. Environmental Protection Agency (EPA) on the technical and regulatory content of the White Bluffs Pickling Acid Crib (Remedial Investigation/) Feasibility Study, DOE/RL-94-20.

If you have any questions or concerns regarding these comments, please contact me at (509) 376-4919.

Sincerely,

Pamela S. Innis
Unit Manager

Enclosure

cc: D.C. Teel, Ecology
B.A. Austin, WHC
P. Valcich, WHC
J. Ross, PRC
B. Drost, USGS
Administrative Record, Pickling Acid Crib (100-IU-5)

The U.S. Environmental Protection Agency has completed the review of the Pickling Acid Cribs Feasibility Study, DOE/RL-94-20. General comments are followed by specific comments.

General Comments

In general, the report is technically accurate and is consistent with the scope of work.

The report should be titled as a Remedial Investigation/ Feasibility Study. Information from both the ERA investigation and risk assessment as well as the alternative analysis are included in this report. This change should be carried throughout the report.

One area of concern is that samples were analyzed for volatile organic compounds, semivolatile organic compounds, anions (including nitrate/nitrite), four radionuclides, and a full range of heavy metals. However, the feasibility study discusses only two radionuclides, anions (including nitrate/nitrite), and a limited number of heavy metals. The rationale for excluding the other analytes from the discussion should be provided.

Specific Comments

Executive Summary, Page ES-1, second paragraph: The basic goal of an ERA is not as stated. The goal of an ERA is mitigate a threat or potential threat to human health or the environment in an expedited fashion.

Site Background, Page ES-1, first paragraph: It would be beneficial to note in this paragraph that the groundwater will be investigated as part of the 100-IU-2 operable unit.

Description of the Preferred Alternative, Page ES-2: Delete the word Preferred from the title of this section. Delete the last sentence in this paragraph and change the second sentence to read that the FS supports a No Action alternative. The function of the RI/FS is provide information in order to make a decision. The proposed plan should set forth the preferred alternative.

Section 1, Page 1, last paragraph: Include a sentence noting that the groundwater will be included as part of the 100-IU-2 operable unit.

Section 1.2.1, Page 5, second paragraph: The first sentence is poorly written and should be modified. Include information about the construction of the cribs (ie. two excavated trenches filled with gravel).

Section 2.2.2, Page 11, third paragraph: Include a definition of incremental cancer risk and hazard quotient within the text.

Section 2.4.1 and 2.4.2, Page 12: The information concerning evidence of animals at the surface basin area is inconsistent. The last sentence of each section are contradictory. Clarify this inconsistency.

Section 2.7.2, Page 14, first paragraph: If total chromium is found to be above the Hanford site background a risk assessment should be completed for this contaminant using the HSRAM methodology. Comparing a reported analyte level to concentrations in the earths crust is not acceptable.

Section 4.0, Page 15: Delete "and Preferred Alternative" from the title of this section and delete the last sentence of this section. The function of the RI/FS is provide information in order to make a decision. The proposed plan should set forth the preferred alternative.

PICKLING ACID CRIBS FEASIBILITY STUDY

EXECUTIVE SUMMARY

The Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) recommended in a letter dated March 4, 1992 that the Department of Energy (DOE) prepare an expedited response action (ERA) for the White Bluffs Pickling Acid Cribs Site. The lead regulatory agency for the ERA is the EPA, with Ecology providing support. The ERA characterization activities were conducted in November 1992. It follows applicable sections of 40 CFR 300, Subpart E (EPA 1990), the Hanford Federal Facility Agreement and Consent Order Environmental Response, Comprehensive Environmental Response Compensation and Liability Act, the Resource Conservation and Recovery Act of 1976; and the State of Washington Model Toxics Control Act.

An ERA's basic goal is to achieve cleanup actions in the earliest possible time frame at the lowest costs. This activity may lead to issuance of an Interim Record of Decision (ROD).

To implement this, the agreement parties jointly developed the Hanford Past Practice Strategy. This feasibility study (FS) is one of the steps required to reach a ROD.

SITE BACKGROUND

The 100-IU-5 Operable Unit only contains the White Bluffs Pickling Acid Cribs source (soil) zone. The two cribs are south of the White Bluffs Town Site in the Hanford Site 600 area. The cribs are side by side and are each about 200 feet by 50 feet. The White Bluffs Area was the location of construction activities during the early days at Hanford. After construction, all of the White Bluff facilities were torn down. Little is known about crib activities during these construction years.

It is believed the cribs received waste streams via underground pipelines from a pipe fabrication facility operating between 1943 and 1959. The pipe fabrication facility was northeast of the cribs. It prepared pipes for installation in the reactor facilities. The waste streams were primarily acid etch solutions containing spent nitric and hydrofluoric acids.

SUMMARY OF THE FEASIBILITY STUDY

This FS report is organized in a format similar to the *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final Manual* (EPA 1988). This FS report does not include evaluations of cleanup alternatives since there is no site contamination.

During the ERA, data was taken at the surface basin adjacent to the crib site. The basin is not in the 100-IU-5 Operable Unit. Risk assessment information and data on the surface basin is included in this report for informational purposes only.

SCOPE AND ROLE OF RESPONSE ACTION

The ERA characterized the site using historical research, visual site surveys, radiological surveys, ground penetrating radar and electromagnetic induction surveys, and soil sampling. Based on the characterization activities and Hanford site background levels, only one detected nonradioactive element (zinc) had readings above background.

The elevated zinc reading is in one centralized spot (adjacent to an underground pipe). During the ERA characterization activities, the galvanized pipe was scrapped by a backhoe. Nevertheless, zinc was carried through the human health and ecological risk assessments. The human health evaluated zinc quantitatively and eliminated it based on a risk based screen. The risk based screen identified that the most restrictive soil concentration for zinc as 2400 mg/kg. The maximum reading detected at the site (554 mg/kg) is well below that amount.

The ecological risk assessment explained that zinc is relatively nontoxic. Both the human health and ecological assessments eliminated zinc from being a contaminant of concern.

DESCRIPTION OF THE PREFERRED ALTERNATIVE

Since there is no site contamination, there is no reason to evaluate cleanup alternatives. This FS recommends the "No Action" alternative. The recommended "No Action" alternative does not require any further action other than a proposed plan and an ROD.

LIST OF ACRONYMS

ARAR	applicable or relevant and appropriate requirement
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	Code of Federal Regulations
COPC	contaminants of potential concern
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy-Richland Field Office
DQO	data quality objective
Ecology	Washington State Department of Ecology
EMI	electromagnetic surveys
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
ERA	expedited response action
ERE	Environmental Restoration Engineering
FS	feasibility study
GM	Geiger-Muller probe
GPR	ground-penetrating radar
HEIS	Hanford Environmental Information System
HFSUWG	Hanford Future Site Uses Working Group
HSBRAM	Hanford Site Baseline Risk Assessment Methodology
HSWA	Hazardous and Solid Waste Amendments (of 1984)
HEAST	Health Effects Assessment Summary Tables
HQ	hazard quotient
ICR	incremental cancer risk
IRIS	Integrated Risk Information System
IRM	interim remedial measure
IU	isolated unit
LFI	limited field investigation
MCL	maximum contaminant level
MTCA	Model Toxics Control Act
MTCACR	Model Toxics Control Act Cleanup Regulations
NA	not applicable
NCP	National Oil and Hazardous Substances Contingency Plan
NR	not reported
NPL	National Priorities List
OU	Operable Unit
PEF	Particulate Factor
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act of 1976
RfD	reference dose
RI	remedial investigation
ROD	record of decision
SF	slope factor
TAL	Target Analyte List
TBC	to be considered
TCL	Target Compound List
TOC	total organic carbon
TSD	treatment storage and disposal
UCL	upper confidence limit
UTL	upper tolerance limit
WAC	Washington Administrative Code
WHC	Westinghouse Hanford Company

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FIGURES:

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1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Hanford Site is divided into numerically designated operable areas which include the 100, 200, 300, 400, 600, and 1100 Areas. In November 1989, the U.S. Environmental Protection Agency (EPA) identified the 100, 200, 300, 600, and 1100 Areas as being on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement (TPA)) signed by DOE, EPA, and the Washington State Department of Ecology (Ecology), includes over 1,000 inactive waste disposal and unplanned release site grouped into source and groundwater operable units. The contamination in the operable units is in the form of solely hazardous waste, radioactive mixed waste, and other CERCLA hazardous substances.

Since signing the Tri-Party Agreement, the parties to the agreement have recognized the need to modify the approach to conducting investigations and studies at Hanford with a goal of maximizing efficiency, optimizing use of limited resources, and achieving cleanup in the earliest possible time frame. This lead to the development of the Hanford Site Past Practice Strategy (DOE-RL 1991d). This strategy recognized that the Hanford Site presents many unique circumstances that call for innovative approaches to conducting investigations and feasibility studies (FS). This strategy provides new concepts for (1) accelerating decision making by maximizing the use of existing data consistent with data quality objectives, and (2) undertaking expedited response actions (ERA's) and/or interim remedial measures as appropriate to either remove threats to human health and welfare and the environment or to reduce risk by reducing toxicity, mobility, or volume of contaminants.

The EPA and Ecology recommended in a letter dated March 4, 1992 (Attachment 1) that DOE prepare an ERA for the White Bluffs Pickling Acid Cribs Site (Location, Figure 1). The lead regulatory agency for this ERA is the EPA, with Ecology providing support. The ERA characterization activities were conducted in November 1992. It followed applicable sections of 40CFR 300, Subpart E (EPA 1990), the *Hanford Federal Facility Agreement and Consent Order Environmental Response, CERCLA, the Resource Conservation and Recovery Act of 1976* (RCRA); and the State of Washington *Model Toxics Control Act.* (MTCA).

The White Bluffs Pickling Acid Cribs Site location is in the 600 Area near the 100 F Area. The cribs are the only waste site within the 100-IU-5 operable unit (Figure 1 and 2). An ERA was performed with the goal of reducing the potential of any residual contaminant migration from the cribs to the soil column and groundwater.

1.1 PURPOSE AND ORGANIZATION OF REPORT

This report follows the Hanford Past-Practice remedial investigation/feasibility study (RI/FS) process to ultimately lead to the issuance of a Record of Decision (ROD) and closure of the operable unit. Figure 3 displays a flowchart of this particular ERA path leading to the final remedy selection for the operable unit.

Figure 1. Location of the White Bluffs Pickling Acid Cribs.

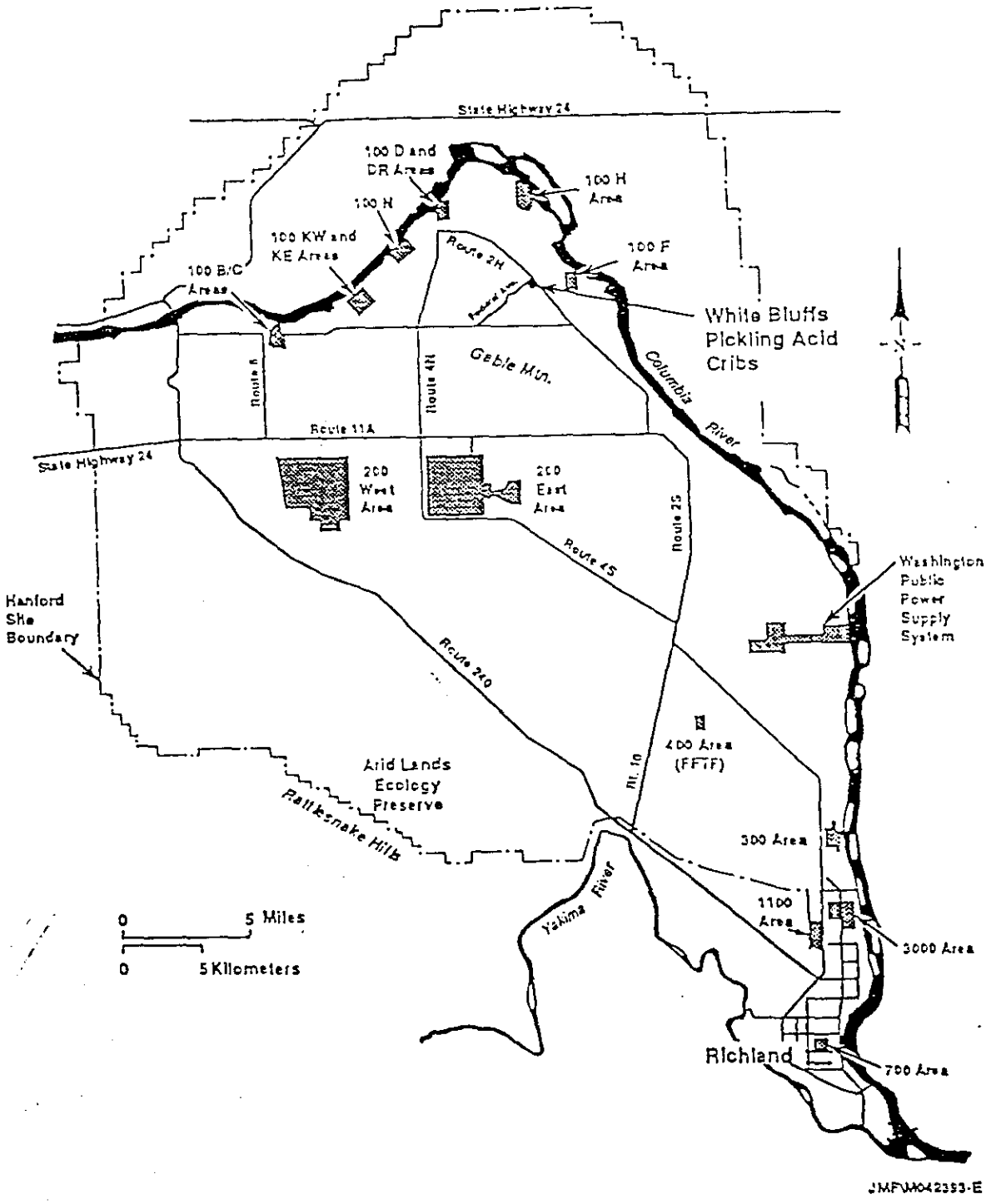
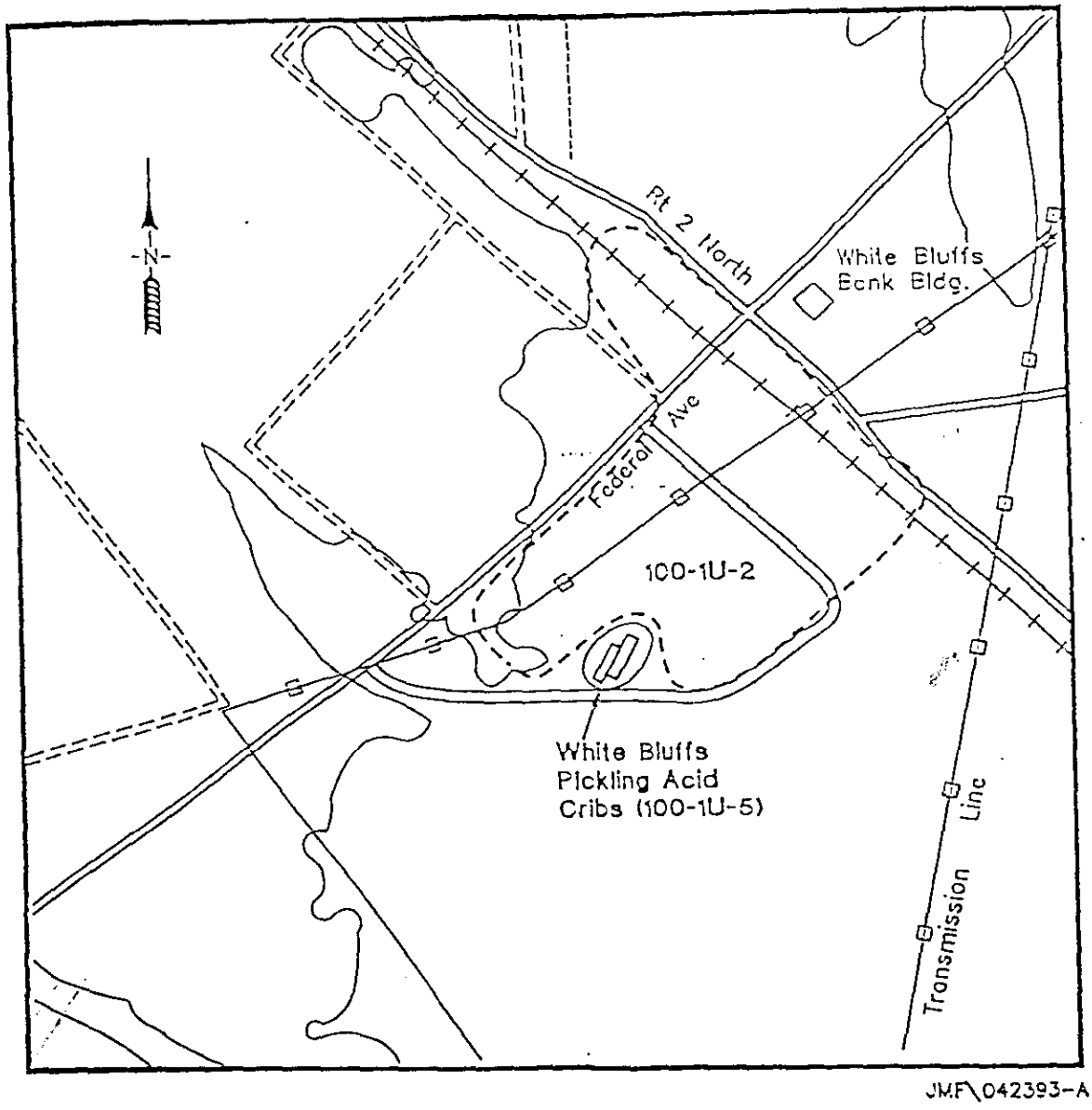


Figure 2. Location of the 100-IU-2 and 100-IU-5 Operable Units.



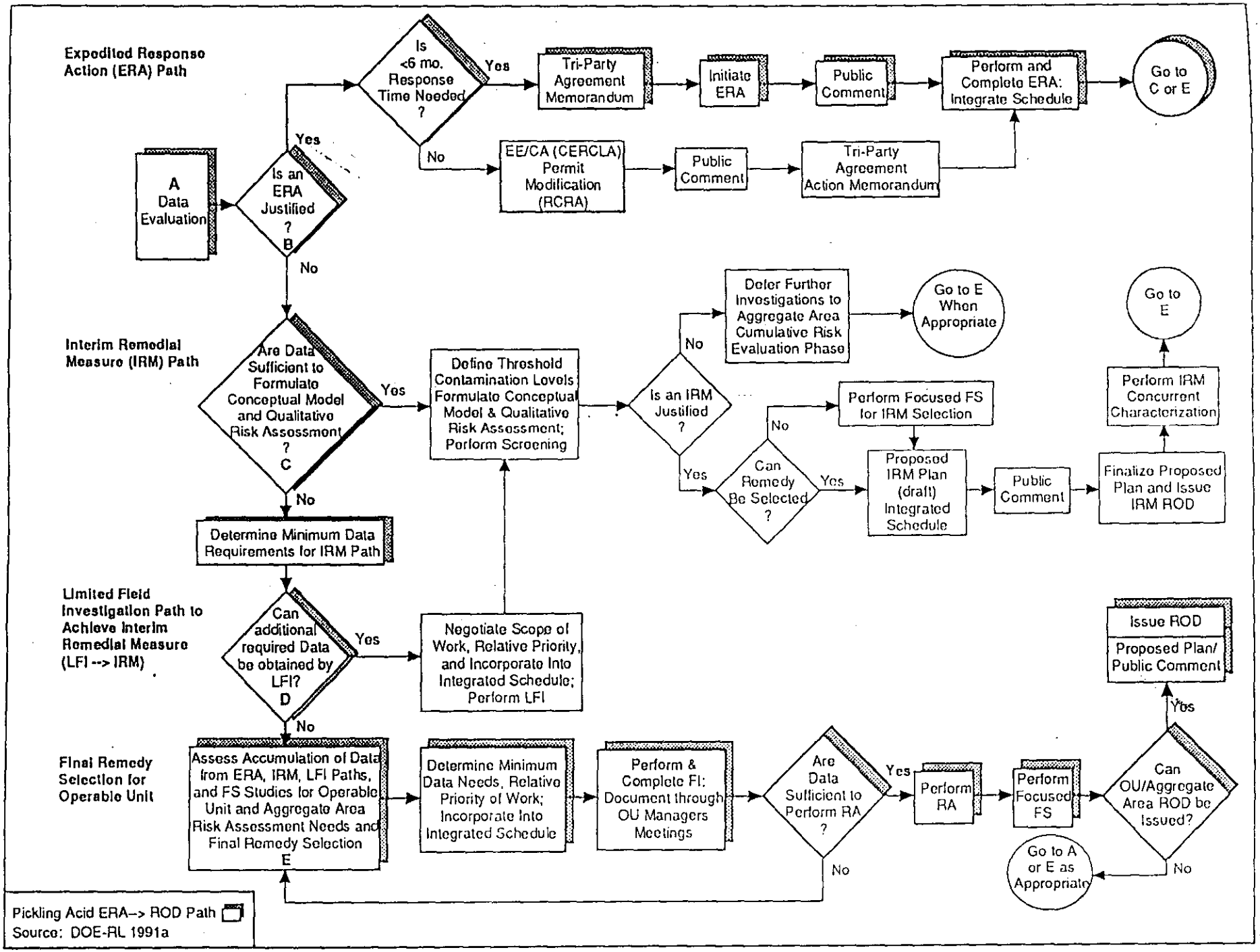


Figure 3. Hanford Site Past-Practice ERA and RI/FS Process for the 100-IU-5 Pickling Acid Cribs

1.1.1 Report Organization

Four chapters are included in this report. This report is structured to provide detailed information on the site characterization and risk assessment, and to recommend a preferred alternative. Chapter one is the introduction, it gives an overview of the site history, site description, and the nature and extent of contamination. Chapter 2 presents the screening for the contaminants of concern and baseline risk assessment results. Chapter 3 presents the applicable or relevant and appropriate requirements used to determine the cleanup standards. The summary and preferred alternative are stated in Chapter 4. This FS report is organized in a format similar to that recommended by the EPA (EPA, 1988).

1.2 BACKGROUND INFORMATION

1.2.1 Site Description

The White Bluffs Pickling Acid Cribs Site is the only site identified in the 100-IU-5 operable unit. It is south of the White Bluffs Town Site, in the 600 Area. The White Bluffs Area was the location of construction activities during the early days at Hanford. After construction, the White Bluffs facilities were torn down. Other than the historical information obtained in the Hanford Site Waste Management Unit Reports (DOE-RL 1992), little is known about activities conducted at the site. It is believed that the cribs received waste streams (primarily nitric and hydrofluoric acid etch solutions) from a pipe fabrication facility operating sometime between 1943 and 1959. The pipe fabrication facility location is suspected to be northeast of the cribs in 100-IU-2 Operable Unit.

There are two pickling acid cribs at the site, located side by side, are each about 200 ft by 50 ft. Each crib contained three evenly spaced rows of vent pipes, spaced 7 to 9 ft apart, which protruded from the cobbled surface and run the length of each crib. A riser pipe about, 36-in. diameter, protruded from the northern end of the west crib. This pipe was removed during the investigation to obtain samples of soil beneath it. The cribs were fed by underground pipelines suspected to come from the northeast (Figures 4-6).

North east of the cribs are areas that appear to have been disturbed. The area debris indicates the possible presence of a landfill and/or building demolition areas. In addition, south east of the cribs is another area which appears to have been disturbed. The area is a depression that is approximately 280 ft x 130 ft. It is believed to have been a surface basin (as it will be referred to in this document). Both of these disturbed areas are part of the 100-IU-2 operable unit.

1.2.2 Site History

Minimal historical data exists regarding the use of the White Bluffs Pickling Acid Cribs. Available information indicates only that the pickling process used "several thousand gallons of acid" (DOE-RL 1992). This volume is believed to be a 9-12% acid in an acid etch aqueous solution. While this information is not specific regarding quantities, it was useful in narrowing the constituents of concern to acids and the etching byproducts.

Figure 4. GPR Report Pipe Layout.

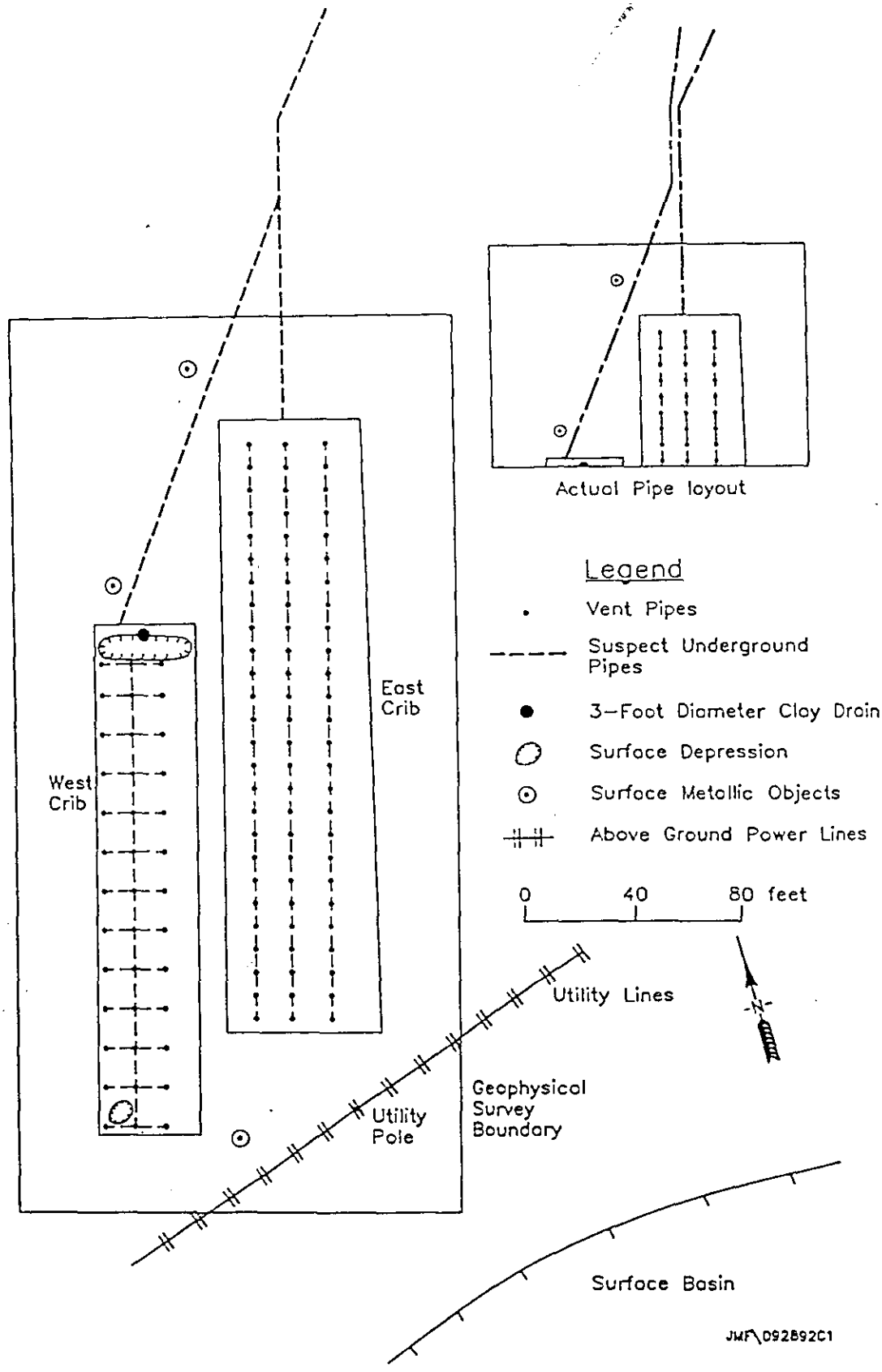


Figure 5. Plan and Sections Through Cribs.

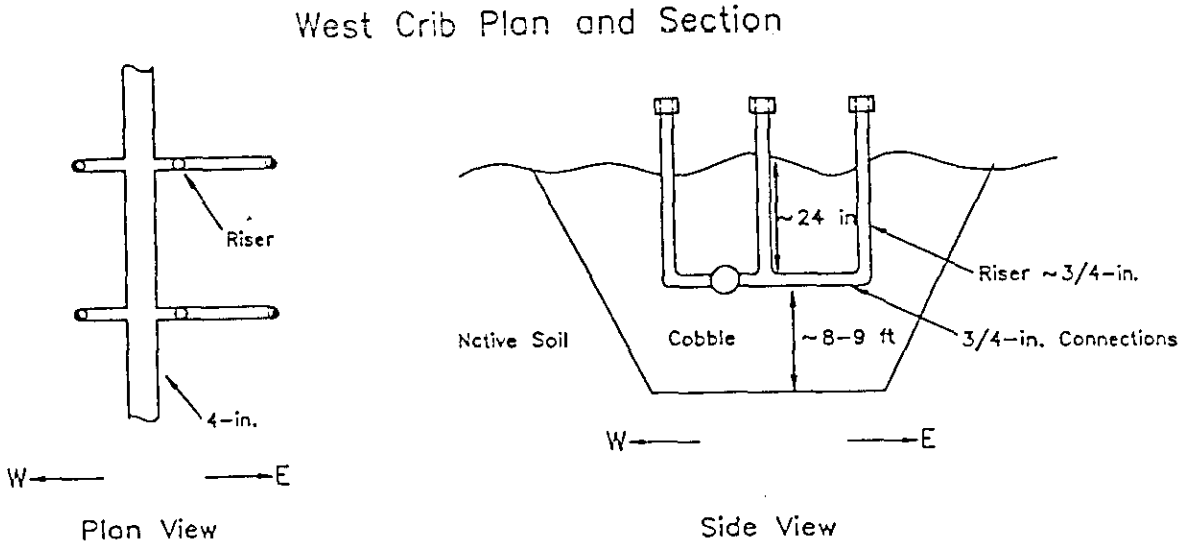


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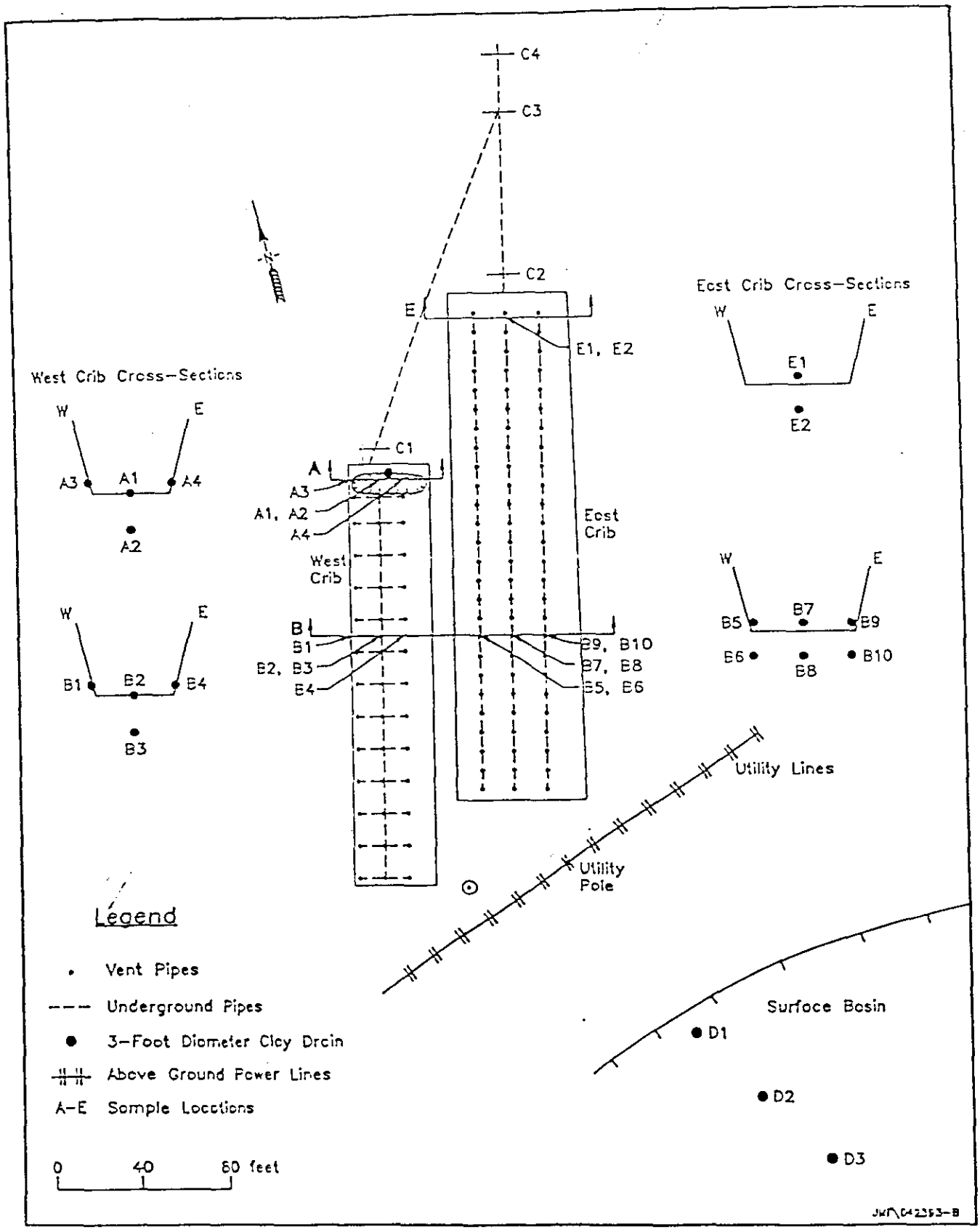
Figure 6. Soil Sampling Locations.



1.2.3 Nature and Extent of Contamination

The nature and extent of potential soil contamination was determined by surface and intrusive soil samples collected in November 1992. Surface sampling consisted of collecting soil samples to a depth of 1 ft or less. Intrusive soil samples came from test pits at depths to 16 ft below the surface. Samples were taken at 0 ft and 5 ft beneath the soil cobble interface. The test pits were also used to verify the configuration of the piping system. They provided a visual inspection of the crib construction. The excavated material (soil, cobbles) were returned to the cribs after the samples were collected.

Table 1 (Appendix A) details the soil samples, location, and analysis. Figure 6 maps the sampling locations. Sample results are presented and validated in the *White Bluffs Pickling Acid Cribs Expedited Response Action Data Validation Report* (WHC 1993a).

The sampling effort investigated the cribs' feeder pipes ("C" samples in Figure 6) and a depression (the surface basin) on the southeastern corner of the eastern crib ("D" samples on Figure 6). The sample results are in Tables 2 and 3 (Appendix A).

The contamination from the cribs is defined by a step-wise screening process explained in this report's risk assessment section. Chemical constituents detected in soil were compared to levels observed in sample blanks, established background concentrations, and calculated risk-based screening levels. The goal is to identify those compounds that constitute actual contamination and may pose a risk to human health and the environment. The compounds defined in this process were designated contaminants of potential concern (COPC). The baseline health and ecological risk assessments used the COPCs.

2.0 RISK ASSESSMENT

This risk assessment's purpose is to provide a human health and ecological risk assessment for the White Bluffs Pickling Acid Cribs Site.

2.1 CONCEPTUAL MODEL OF HUMAN EXPOSURE

A conceptual model for human exposure used the Hanford Site Baseline Risk Assessment Methodology (HSBRAM) to identify potential human exposure pathways (DOE-RL 1993b). The conceptual model summarizes exposure paths that hazardous substances may take to reach potential receptors. The key elements necessary for a complete exposure pathway are:

1. A source and mechanism of contaminant release
2. Transport mechanisms and media
3. Exposure media
4. Exposure routes
5. Human receptors

All elements must be present for an exposure pathway to be complete. At the Pickling Acid Cribs the contaminant source is soil. The release and

transport mechanisms of the soil include wind erosion and direct human contact with the soil through intrusive activities. Release mechanisms can be divided into primary and secondary categories. A primary release is from a primary contaminant source, and a secondary release is from a secondary contaminant source. The most significant release source at Hanford is infiltration of past discharges of process effluents into underlying soils (primary transport) followed by the release of contaminated surface soils through fugitive dust or volatile emissions or through direct human contact with the soil (secondary release mechanism). For the pickling acid cribs the transport media include soil and air.

Current institutional controls prevent intrusion into the site and at the present time this site is not in use. The Hanford Future Site Uses Working Group (HFSUWG) recommended the pickling acid cribs area be classified for unrestricted land use and listed three options for consideration. The options are: 1. Native American uses; 2. limited recreation, recreation-related commercial, and wildlife; and 3. wildlife and recreation (Drummond, et al 1992). Since future land use is not yet defined, a conservative approach will be used for the human health evaluation.

The risk evaluation for the pickling acid cribs is conducted assuming a conservative residential land use scenario for which the oral, inhalation and external exposure pathways are evaluated. The residential exposure parameters include intake rate, exposure frequency and duration, body weight, and averaging time. The exposure assessment methodology is presented in Section 2.2 and Appendices A and C of the HSBRAM (DOE-RL 1993b).

The maximum detected concentration of a COPC detected in a specific medium is used as the exposure point concentration. The maximum concentration is used rather than calculating a 95% upper confidence limit of the mean (UCL). This is due to the limited number of samples that are available for the Pickling Acid Crib.

2.2 IDENTIFICATION OF COPC'S IN PICKLING ACID CRIBS

The identification of COPC's is conducted according to recommendations provided in the HSBRAM (DOE-RL, 1993b), and Risk Assessment Guidance for Superfund (EPA, 1989).

Data obtained from the White Bluffs Pickling Acid Cribs Expedited Response Action Proposal (DOE-RL, 1993c) and from the data validation report for the Pickling Acid Crib ERA (WHC, 1993a) are used to identify COPCs. Identification of COPCs is a two step process. Data is first assessed for useability, then a useable data screening is performed as recommended in HSBRAM (DOE-RL, 1993b).

2.2.1 Data Usability

In the data usability assessment the minimum and maximum concentrations of each contaminant are identified from the data validation report (WHC, 1993a). A qualifier for the maximum value is assigned if appropriate. The inorganic analytes are compared to equipment blank concentrations and are considered a positive sample if they exceed five times the maximum amount detected in any blank (EPA, 1989). The positive samples are carried through

the risk assessment screening. Data usability is evaluated in Tables 4 through 7 (Appendix A).

2.2.2 Screening of Usable Data

In screening of usable data, the maximum concentration of the nonradioactive analytes are compared to Hanford site background concentration obtained from the log normal distribution and the 95% UTL (upper tolerance limit) based on 95% coverage (DOE-RL, 1993a). If the nonradioactive analyte concentration is less then the Hanford Site background concentration, it is eliminated from further evaluation in the risk assessment.

Radionuclide sample concentrations are eliminated if the sample concentration is within the range of the environmental monitoring sample background concentrations (WHC, 1993b, PNL 1987-1992). The background concentrations are based on distant offsite sampling points that include Yakima, Sunnyside, McNary Dam and Connell. These preliminary background samples are a regional data set and are considered conservative. The background concentrations are used because Hanford Site background concentrations are not yet available. Since there has been no documented release of radionuclides at the pickling acid cribs, a radionuclide risk assessment is not required.

The remaining analytes are carried through the risk-based screen (DOE-RL, 1993b). The objective of the risk-based screen is to use target risk and toxicity information to evaluate which constituents are most likely to contribute significantly to risk. The risk-based concentrations used for screening the COPC's are based on target criteria of an incremental cancer risk (ICR) of 1E-07 for carcinogenic effects and a hazard quotient (HQ) of 0.1 for noncarcinogens effects. The exposure parameters for the residential scenario are used for the risk-based screening. The risk-based concentrations noted in Tables 4 through 7 (Appendix A) represent the most restrictive soil concentration and exposure pathway.

The analytes that exceed the risk-based concentration are retained for human health evaluation. All analytes that exceed Hanford site background concentrations, even if less then the risk-based screen concentration, are retained for ecological risk evaluation. Both are indicated by shading in Tables 4 through 7 (Appendix A).

2.3 HUMAN HEALTH RISK ANALYSIS

The human health evaluation quantifies exposure by first estimating intake using the parameters and assumptions for the residential scenario. The intake is then converted into a cancer risk value or a non-cancer risk value based on the toxicity of the contaminants of potential concern. For cancer effects, toxicity is evaluated using slope factors from the Integrated Risk Information System (IRIS) and the Health Effects Assessment Summary Tables (HEAST). For systemic (non-cancer) effects, toxicity is evaluated using a reference dose obtained from IRIS. The COPC's are considered a human health risk if the calculated risk value exceeds an ICR of 1E-06 for carcinogenic contaminants, and an HQ of 1.0 for noncarcinogenic contaminants.

To calculate intake concentrations for soil samples that were taken for

the pickling acid cribs site, these samples must be converted to fugitive dust concentrations to calculate risk for the inhalation pathway. Intakes for the inhalation of fugitive dust were calculated using the respirable particulate factor (PEF) of 2.0+07 m^3/kg. This value is based on the National Primary Ambient Air Quality Standard for particulate matter of 50 ug/m^3 and the assumption that 100% of the particulate is retained in the lungs and absorbed.

2.4 ECOLOGICAL RISK ANALYSIS

2.4.1 Ecological Receptors

Consistent with 100-Area Qualitative Risk Assessments, the Great Basin pocket mouse was chosen as the potential receptor to measure ecological risk. While no evidence of any animal was seen on the cribs or surface basin area, rodents are active adjacent to the cribs.

2.4.2 Ecological Physical Setting

Once disturbed, terrestrial habitats on most of the Hanford Site will become dominated by cheatgrass with tumbleweed and tumblemustard if enough soil exists. If insufficient soil remains in place for cheatgrass, the land tends to either support tumbleweed or be void of vegetation. This pattern exists at the pickling acid cribs. A significant amount of the disturbed surface has lost the natural cover of sandy soils and is bare cobble. The rest is dominated by cheatgrass, with tumbleweed and tumblemustard also present. The species and condition of vegetation appeared normal for a disturbed site with sandy soils. During a survey on October 27, 1993, the sandy soils around the cribs showed small rodent (probably Great Basin pocket mouse) tracks and diggings. Some badger digging was also present near the crib sites. However, no evidence of animal activity was seen on the cobble of the cribs themselves. Deer and a loggerhead shrike were seen within 100 m of the site. The area identified as the surface basin was vegetated almost entirely with cheatgrass and tumbleweed, indicating past disturbance. It had limited sign of small mammal activity; common animals, such as the pocket mouse, are probably resident.

2.5 CONTAMINANTS OF CONCERN

In the 100-IU-5 operable unit one metal (zinc) is retained for further ecological consideration based on comparisons with background. It is reported above Hanford site background in the underground pipes (Table 7). It's concentrations range from 35.0 to 1070 ppm. Friberg et al (1979) gives average range of zinc concentrations in soil as 10 to 300 ppm. Zinc is relatively nontoxic, and zinc deficiencies in diets appear to be more significant than excessive zinc (Friberg et al 1979). However, Friberg et al reports that additions of approximately 1000 ppm zinc in the diets of weanling pigs for more than one month depressed the rate of growth and food intake.

The Pickling Acid Cribs Expedited Response Action Proposal (DOE-RL, 1993c) discusses the source of the highest values of zinc as the galvanized pipe leading into the surface basin. This pipe was scraped while excavating,

and samples were taken directly beside the pipe. In addition, zinc is not listed as a contaminant disposed of at the site. Thus, because zinc is localized and probably from the galvanized pipes, it is not considered further in this risk assessment.

2.6 BASELINE RISK ASSESSMENTS

2.6.1 Human Health Risk Results

All COPC's except zinc are eliminated based on comparison to background concentrations. Zinc is eliminated when compared to risk-based concentrations. Therefore, based on the human health risk assessment there are no contaminants of concern for human health risk associated with the pickling acid crib.

2.6.2 Ecological Risk Results

Zinc concentrations are greater than Hanford site background concentrations and therefore it is retained for ecological evaluation. The highest zinc sample concentrations are taken directly beside the underground pipes. The pipes were scraped during excavation and are probably the source of the zinc. Because the zinc is localized and is not listed as a contaminant disposed of at the site, it is not considered a contaminant of concern for ecological risk.

2.6.3 Uncertainty in the Risk Assessment Process

The risks presented in this risk assessment are conditional estimates given multiple assumptions about exposures, toxicity, and other variables. The uncertainty in the risk characterization focuses on specific uncertainties related to the waste site (e.,g., data evaluation), sampling quantity, and to the risk assessment process (e.g., toxicity information, exposure assumptions, etc.).

2.7 HUMAN HEALTH AND ECOLOGICAL ANALYSIS OF SURFACE BASIN

The identification of COPC's in the surface basin is given for informational purposes only as this area is not included in the 100-IU-5 operable unit. Chromium VI, nickel and zinc are retained for human health and ecological risk evaluation (Appendix A, Tables 6 and 8).

2.7.1 Surface Basin Human Health COPC's

Chromium was detected in the surface basin at a maximum concentration of 43.1 mg/kg which represents a 1E-05 risk for the residential scenario inhalation pathway (Appendix A, Table 9). All chromium is assumed to be chromium VI which is the most toxic form and provides the most conservative risk analysis. The concentrations used for determining the risk for this site were based on total chromium analyses and it is likely that a portion of the chromium that is quantified is chromium III which is a less toxic form.

2.7.2 Surface Basin Ecological COPC's

Total chromium is reported in a range of 10.2 to 43.1 ppm in three of three samples, with reported background of 27.9 ppm (DOE/RL 1993a). The concentration in the earth's crust is 125 ppm, with soil content ranging from trace to 250 ppm (Friberg et al. 1979). Thus, the 15.2 ppm difference between the reported background and highest chromium value in the surface basin (43.1 ppm) does not appear to be significant.

Zinc is reported above background in the surface basin (values of 50.5, 68.7, and 554.0 ppm, Appendix A, Tables 2 & 6). The maximum is less than half the level reported by Friberg et al (1979) to have noticeable effects on weanling pigs (reduced growth rates). It is not a contaminant known to be disposed of to the site, and does not appear to be of ecological significance.

Nickel is also reported above Hanford site background concentrations and is also retained for further analysis (Appendix A, Table 6). Results for nickel ranged from 9.2 to 27.8 ppm. The reported background in DOE/RL (1993a) is 25.3 ppm; background for the pickling acid crib (3 samples) was 8.7 to 9.9 ppm. Two 100-Area background soil samples from the biota sampling project reported nickel concentrations of 6.5 and 9.7 ppm (Landeen et al. 1993). Nickel is an essential element for some animal species and concentrations in farm soil range from 3 to 1000 ppm depending on the mineral content of the top soil (Friberg, et al 1979). These values indicate that the result of 27.8 ppm, while 2.5 ppm above the reported Hanford site background concentrations (DOE-RL, 1993a) is within a normal range for nickel in the soil.

3.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 7.5 of the Action Plan in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989) contains the basic description of applicable or relevant and appropriate requirements (ARAR). The ARAR's include cleanup standards, standards of control, and other substantive environmental protection requirements and criteria for hazardous substances as specified under Federal or State laws and regulations in addition to certain other non-promulgated criteria. ARAR's fall into three general categories, chemical-specific requirements, action-specific requirements, and location-specific requirements.

Chemical-specific ARAR's establish specific numerical cleanup values, either directly or via a methodology that when applied results in a specific value. Action-specific ARAR's set technology or activity based requirements or limitations on actions taken with respect to hazardous wastes. Location-specific ARAR's are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in a special location. Non-promulgated or "to-be-considered" (TBC) criteria can be applied if necessary to assure protection of human health and the environment.

ARAR's and TBC's apply when hazardous substances, pollutants or contaminants are to remain onsite as part of a remedial action (Ecology et al. 1989), and also apply, to the extent practical, to removal actions (EPA 1991b). In short, ARAR's and TBC's apply to cleanup activities, for the purpose of protecting human health and the environment.

Based on the human health and ecological risk assessments, the White Bluffs Pickling Acid Cribs do not now pose an unacceptable risk to human health or the environment. In the absence of unacceptable human health or environmental risks, no cleanup actions at the White Bluffs Pickling Acid Crib are necessary.

ARAR's and TBC's apply to cleanup activities. There are no cleanup activities needed at the White Bluffs Pickling Acid Crib. Therefore, there are no ARAR's or TBC's that apply to the White Bluffs Pickling Acid Crib FS.

4.0 SUMMARY AND PREFERRED ALTERNATIVE

The chemical concentrations detected at the White Bluffs Pickling Acid Cribs Site indicated that the cribs pose no threat to human health or the environment. This was verified by the risk assessment (Appendix A, Table 10). In the human health risk assessment screening process, all contaminants of potential concern concentrations (except zinc) are less than background and were eliminated on that basis. Zinc was eliminated based on human health and ecological risk assessments.

Based on these results, there is no need to develop or screen remediation alternatives. There is only one alternative, that is "No Action." Thus, there is no need to include sections in this report for developing, screening, or detailed analysis of alternatives as suggested in the typical FS Report Format (EPA, 1988).

No action to remove contamination is required for the completion of the White Bluffs Pickling Acid Cribs ERA and FS. It is recommended that a No Further Action Interim Record of Decision be issued to the DOE for the 100-IU-5 operable unit.

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APPENDIX A

This appendix contains all the tables referred to in the White Bluffs Pickling Acid Cribs Feasibility Study Report. The tables include summarized results from the White Bluffs Pickling Acid Crib Expedited Response Action (ERA) Proposal, and the human health and ecological risk assessments.

Tables 2 and 3 present the condensed results of soil sampling analysis. The two tables have been separated into anions and metals, which were the primary contaminants of concern during the characterization activities. Both sets of data have been condensed to include only metals and anions, which would be indicators of acid etch solution disposal. A complete set of all sample analysis results is provided in the ERA proposal. The definition of qualifiers is presented below.

U Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ Indicates the compound or analyte was analyzed for and not detected. Because of quality control (QC) deficiencies identified during data validation, the value reported may not accurately reflect the sample quantitation limit.

J Indicates the compound or analyte was analyzed for and detected. The associated value is estimated, but the data are usable for decision-making processes.

R Indicates the compound or analyte was analyzed for and because of an identified QC deficiency the data are not usable.

JN Indicates presumptive evidence of a compound at an estimated value.

VJN Indicates the compound or analyte was originally identified from presumptive evidence. Because of QC deficiencies identified during data validation, the value reported may not accurately reflect the sample quantitation limit.

Table 1. Soil Sampling Locations and Analyses.

SAMPLE SITE	SAMPLE IDENTIFIER (HEIS #)	LOCATION OF SAMPLE	ANALYSES
A1	B07PY8	10 ft below surface, taken within 1 foot of interface between soil and crib bottom.	FS
A2	B07PZ1	14 ft below surface, directly beneath A1	FS
A3	B07PY9	9 ft below surface	SS
A4	B07PZ3	8 ft below surface	SS
B1	B07PZ5	6-7 ft below surface	SS
B2	B07PZ6	11-12 ft below surface	FS
B3	B07PZ7	15-16 ft below surface	FS
B4	B07P78	6-7 ft below surface	SS
B5	B07PZ9	5-6 ft below surface	SS
B6	B07Q00	10-11 ft below surface	SS
B7	B07Q01	5-6 ft below surface	FS
B8	B07Q03	10-11 ft below surface	FS
B9	B07Q04	5-6 ft below surface	SS
B10	B07Q05	10-11 ft below surface	SS
C1	B07Q06	3-4 ft below surface	SS
C2	B07Q09	4-5 ft below surface	SS
C3	B07Q07	3-4 ft below surface	SS
C4	B07Q08	3-4 ft below surface	SS
D1	B07Q10	6-12 in. below surface	SS
D2	B07Q11	6-12 inches below surface	SS
D3	B07Q12	6-12 inches below surface	FS
E1	B07PZ2	7 ft below surface	FS
E2	B07PZ4	12 ft below surface	FS
NA	B07Q02	Duplicate of sample B07Q01	FS
NA	B07Q13	Split of sample B07Q12	FS
NA	B07Q14, B07Q15, B07Q16	Background samples, taken in undisturbed soil west of the cribs (6-12 inches below surface)	SS
NA	B07PZ0	Equipment Blank	SS

FS = Indicates sample was analyzed for the full suite of analyses, which includes TAL Metals, 6010 FOR ZR, Anions (EPA 300.0), Nitrate/nitrite (EPA 353.2), Ammonia, pH, Calcium Carbonate (Hardness, EPA 130.2), Semi-VOA (CLP), VOA (CLP), Gamma Spec, TPH (Diesel Range), TPH (Heavier than Diesel Range)

SS = The short list samples were analyzed for expected contaminants. These are all categories in the FS list that have been underlined.

NA = Not Applicable, sample site not numbered.

Table 2. Metals (Reported in mg/kg). (Sheet 1 of 2)

Sample	Al	Cr	Cu	Fe	Pb	Mg	Mn	Ni	Zn	Zr
B07PY8	5360	9.1	23.5	14600	3.9	3310	138 J	6.2 B	71.8	17.1 U
B07PY9	5650	9.4	16.7 U	14200	3.4	3610	142 J	8.3	63.7	17.5 U
B07PZ1	5700	11.2	20.7	13500	4.1	4080	175 J	9.5	50.7	18.0
B07PZ3	5020	8.0	13.6 U	15300	3.1	3460	149 J	7.1 B	60.5	18.3 U
Section A Avg.	5433	9.4	18.6	14400	3.6	3615	151	7.8	61.7	17.7
B07PZ2	5010	9.3	17.3 U	12700	3.1	3720	156 J	8.8	30.3	17.4 U
B07PZ4	5550	10.0	17.6 U	13200	4.0	4350	213 J	10.3	31.3	18.6 U
Section E Avg.	5280	9.7	17.5	12950	3.6	4035	185	9.6	30.8	18.0
B07PZ5	6810	14.0	17.6 U	15900	4.2	5130	226 J	14.3	43.0	18.2 U
B07PZ6	4310	7.7	15.2 U	12900	3.5	2960	144 J	7.9 B	30.5	17.9 U
B07PZ7	4630	8.7	13.7 U	12300	2.6	3570	177 J	8.0 B	28.8	18.1 U
B07PZ8	4640	9.1	11.0 U	11600	2.5	3520	149 J	8.7	28.0	17.3
B07PZ9	7000	13.6	16.9 U	15600	6.5	6500	265 J	13.3	40.9	18.6 U
B07Q00	4140	7.5	13.7 U	14900	2.5	3420	183 J	8.8	30.6	17.4 U
B07Q01	5800	10.2	14.6 U	15000	3.3	4620	190 J	10.8	35.6	17.5 U
B07Q03	4320	9.3	11.8 U	12600	2.9	3560	178 J	8.8	28.0	16.9 U
B07Q04	5930	11.0	10.5	16000	3.4	4920	212	10.7	38.2	18.7 U
B07Q05	4170	7.2	13.2	15900	2.5	3470	218	9.6	33.6	20.8 U
Section B Avg.	5175	9.8	13.8	14270	3.4	4167	194	10.1	33.7	18.1
B07Q06	5730	10.0	9.7	17600	2.9	4390	240	9.8	35.0	17.3 U
B07Q09	5720	7.9	10.7	20800	3.4	4320	376	11.3	46.6	17.7 U
B07Q07	6010	9.9	10.4	19100	3.6	4410	257	10.6	1020.0	25.9
B07Q08	4070	6.5	6.6 U	12900	4.3	3220	196	7.4 B	1070.0	17.9 U
Section C Avg.	5383	8.6	9.4	17600	3.6	4085	267	9.8	542.9	19.7

Table 2. Metals (Reported in mg/kg). (Sheet 2 of 2)

SAMPLE	Al	Cr	Cu	Fe	Pb	Mg	Mn	Ni	Zn	Zr
B07Q10	5730	10.2	18.7	16300	6.7	3740	190	9.2	68.7	19.2 U
B07Q11	8060	13.3	14.2	23400	5.1	5210	263	12.5	554.0	19.4 U
B07Q12	7370	43.1	11.4	19200	3.9	4040	177	27.8	50.5	17.2 U
Section D Avg.	7053	22.2	14.8	19633	5.2	4330	210	16.5	224.4	18.6
BACKGROUND										
B07Q14	6090	8.5	9.3 U	20500	3.5	3850	347	8.7	46.6	20.9
B07Q15	6090	8.8	9.1 U	17900	3.1	3680	317	8.9	43.3	20.4 U
307Q16	7220	9.8	10.1	23300	3.5	4180	372	9.9	49.4	30.7

Table 3. Anions (Reported in mg/kg).

SAMPLE	NO_3/NO_2 (AS N)	CHLORIDE	FLUORIDE	PHOSPHATE	SULFATE	pH
B07PY8 A1	7.41	1.80 J	0.30 J	0.80 UJ	25.00 J	5.50
B07PY9 A3	3.83	2.30 J	0.40 J	0.80 UJ	15.00 J	6.70
B07PZ1 A2	3.89	1.40 J	0.60 J	1.00 J	13.00 J	7.90
B07PZ3 A4	2.52	1.80 J	1.40 J	1.00 J	10.00	7.20
A Average	4.41	1.83	0.43	0.90	15.75	6.83
B07PZ2 E1	2.42 U	2.10 J	1.10 J	1.00 J	11.00 J	8.30
B07PZ4 E2	2.42 U	2.10 J	0.80 J	1.00 J	11.00 J	8.90
E Average	2.42	2.10	0.95	1.00	11.00	8.60
B07PZ5 B1	2.43 U	2.20 J	0.50 J	2.00 J	6.00 J	9.00
B07PZ6 B2	2.53 U	2.00 J	0.40 J	0.80 UJ	8.00 J	7.80
B07PZ7 B3	2.48 U	1.80 J	0.30 J	1.00 J	6.00 J	8.60
B07PZ8 B4	2.59 U	2.20 J	0.30 J	1.00 J	5.00 J	8.30
B07PZ9 B5	2.46 U	2.20 J	0.70 J	0.80 UJ	10.00 J	8.70
B07Q00 B6	2.46 U	1.80 J	0.30 J	1.00 J	6.00 J	9.10
B07Q01 B7	2.54 U	2.00 J	1.00 J	1.00 J	10.00 J	9.20
B07Q03 B8	2.57 U	2.10 J	0.30 J	1.00 J	6.00 J	9.60
B07Q04 B9	2.55 UJ	2.30 J	1.00 J	1.00 J	6.00 J	9.10
B07Q05 B10	2.52 UJ	2.10 J	0.50 J	0.80 UJ	5.00 J	8.50
B Average	2.51	2.07	0.53	1.04	6.80	8.79
B07Q06 C1	2.47 UJ	12.00 J	1.50 J	0.80 UJ	292.00 J	9.00
B07Q09 C2	2.51 UJ	181.00 J	2.50	0.80 J	329.00 J	8.50
B07Q07 C3	2.42 UJ	7.80 J	1.90 J	2.00 UJ	44.00 J	10.40
B07Q08 C4	2.50 UJ	2.30 J	1.40 J	1.00 J	4.00 J	8.50
C Average	2.48	50.78	1.83	1.15	167.25	9.10
B07Q10 D1	16.30 J	5.10 J	0.70 J	2.00 J	95.00 J	6.80
B07Q11 D2	3.70 J	3.40 J	1.00 J	2.00 J	42.00 J	6.40
B07Q12 D3	3.52 J	11.50 J	1.40 J	1.00 J	23.00 J	7.10
D Average	7.8	6.7	1.0	1.7	53.3	6.8
BACKGROUND READINGS AT THE SITE						
B0Q14	3.24 J	2.3 J	0.6 J	2 J	4 J	
B0Q15	5.81 J	3 J	0.3 J	2 J	54 J	
B0Q16	2.51 UJ	3 J	0.7 J	2 J	4 J	

Table 4. Potential Contaminants of Concern: West Crib (Sheet 1 of 2)

Data Usability					Screening Criteria Based on HSBRAM			Analyte Status
Analyte	Range	Qualifier for Max value	Blank Adjustment		Frequency of Detection	Back-ground(a)	Risk-based screen(b)	
			Max Blank	Analyte Exceeds 5X Rule				
Radionuclides (All concentrations in pCi/g)								
Radium 226	0.42±0.087/ 0.48±0.086				4/4	0.506/0.844(c) 0.6950±0.114(d)	0.63	Eliminated: Less than background
Thorium 228	0.63±0.055/ 0.83±0.061				4/4	0.461/1.35(e) 0.729±0.289(f)	0.12	Eliminated: Less than background
Inorganics (All concentrations in mg/kg)								
Aluminum	4310/6810		33.9	yes	8/8	15600		Eliminated: Less than background
Chromium VI (g)	7.7/14.0				8/8	27.9		Eliminated: Less than background
Copper	20.7/23.5				2/8	28.2		Eliminated: Less than background
Iron	11600/15900		451	yes	8/8	39160		Eliminated: Less than background
Lead	2.5/4.2		0.77	yes	8/8	14.75		Eliminated: Less than background
Magnesium	2960/5130		7.3B	yes	8/8	8760		Eliminated: Less than background
Manganese	138/226	J	0.23J	yes	8/8	612		Eliminated: Less than background
Nickel	6.2/14.3				8/8	25.3		Eliminated: Less than background
Zinc	28.0/71.8				8/8	79		Eliminated: Less than background

Table 4. Potential Contaminants of Concern Screen: West Crib (Sheet 2 of 2)

Data Usability					Screening Criteria Based on HSBRAM			
Analyte	Range	Qualifier for Max Value	Blank Adjustment 5X Rule		Frequency of Detection	Back-ground(a)	Risk-based screen(b)	Analyte Status
			Max Blank	Analyte Exceeds 5X Rule				
Anions (All concentrations in mg/kg)								
Nitrate/Nitrite	2.52/7.41				4/8	199		Eliminated: Less than background
Chloride	1.4/2.3	J	3.0 J	No	8/8	763		Eliminated based on 5 X Rule and less than background
Fluoride	0.3/1.4	J	0.2 J	Yes	8/8	12		Eliminated: Less than background
Phosphate	1.0/2.0	J			5/8	16		Eliminated: Less than background
Sulfate	5.0/25.0	J	3.0 J	Yes	8/8	1320		Eliminated: Less than background
pH	5.5/9.0				8/8	(h)		

J Qualifier indicates the associated numerical value is an estimated quantity. RAGS, 1989
5 X Rule: The sample results are positive if the site sample exceeds five times the maxiumum amount detected in any blank. RAGS, 1989
(a) Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, 95% UTL (DOE, April 1993)
(b) Indicates the most restrictive risk-based soil concentration and exposure pathway
(c) Minimum and maximum values for Hanford site background concentrations of radium-226 (PNL 7346, Hanford Site Environmental Report, 1987-1992)
(d) The mean for Hanford site background concentrations of radium-226 (PNL 7346, Hanford Site Environmental Report, 1987-1992)
(e) Minimum and maximum values for Hanford site background concentrations of thorium-228 (RCRA closure project, WHC-SD-DD-TI-075, Rev 0)
(f) The mean for Hanford site background concentrations of thorium-228 (RCRA closure project, WHC-SD-DD-TI-075, Rev 0)
(g) All chromium is assumed to be chromium VI which is the most toxic form of chromium and provides the most conservative approach to the risk analysis
(h) No Hanford site background pH values are available

Table 5: Potential Contaminants of Concern Screen: East Crib. (Sheet 1 of 2)

Data Usability					Screening Criteria Based on HSBRAM			
Analyte	Range	Qualifier for Max value	Blank Adjustment 5X Rule		Frequency of Detection	Background(a)	Risk-based screen(b)	Analyte Status
			Max Blank	Analyte Exceeds 5X Rule				
Radionuclides (All concentrations in pCi/g)								
Radium 226	0.49±0.068/ 0.57±0.083				5/5	0.506/0.844(c) 0.729±0.114(d)		Eliminated: Less than background
Thorium 228	0.70±0.056/ 0.99±0.072				5/5	0.461/1.35(e) 0.729±0.289(f)		Eliminated: Less than background
Inorganics (All concentrations in mg/kg)								
Aluminum	4140/7000		33.9	Yes	8/8	15600		Eliminated: Less than background
Chromium VI (g)	7.2/13.6				8/8	27.9		Eliminated: Less than background
Copper	10.5/13.2				2/8	28.2		Eliminated: Less than background
Iron	12600/16000		451	Yes	8/8	39160		Eliminated: Less than background
Lead	2.5/6.5		0.77	Yes	8/8	14.75		Eliminated: Less than background
Magnesium	3420/6500		7.3 B	Yes	8/8	8760		Eliminated: Less than background
Manganese	156/265	J	0.23 J	Yes	8/8	612		Eliminated: Less than background
Nickle	8.8/13.3				8/8	25.3		Eliminated: Less than background
Zinc	28.0/40.9				8/8	79		Eliminated: Less than background

Table 5: Potential Contaminants of Concern Screen: East Crib. (Sheet 2 of 2)

Data Usability					Screening Criteria Based on HSBRAM			
Analyte	Range	Qualifier for Max value	Blank Adjustment 5X Rule		Frequency of Detection	Background(a)	Risk-based screen(b)	Analyte Status
			Max Blank	Analyte Exceeds 5X Rule				
Anions (All concentrations in mg/kg)								
Chloride	1.80/2.30	J	3.0 J	No	8/8	763		Eliminated based on 5 X Rule and less than background
Fluoride	0.30/1.10	J	0.2 J	Yes	8/8	12		Eliminated: Less than background
Phosphate	1.00/1.00	J			6/8	16		Eliminated: Less than background
Sulfate	5.00/11.00	J	3.0 J	No	8/8	1320		Eliminated based on 5 X Rule and less than background
pH	8.30/9.60				8/8	(h)		

J Qualifier indicates the associated numerical value is an estimated quanitity. RAGS, 1989
5 X Rule: The sample results are positive if the site sample exceeds five times the maxiumum amount detected in any blank. RAGS, 1989
(a) Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, 95% UTL (DOE, April 1993)
(b) Indicates the most restrictive risk-based soil concentration and exposure pathway
(c) Minimum and maxiumum range for Hanford site background concentrations of radium-226 (PNL 7346, Hanford Site Environmental Report (1987-1992)).
(d) The mean and standard deviation for Hanford site background concentrations of radium-226 (PNL 7346, Hanford Site Environmental Report (1987-1992)).
(e) Minimum and maximum range for Hanford site background concentrations of thorium-228 (RCRA closure project, WHC-SD-DD-TI-075, Rev 0).
(f) The mean and standard deviation for Hanford site background concentrations of thorium-228 (RCRA closure project, WHC-SD-DD-TI-075, Rev 0).
(g) All Chromium is assumed to be Chromium VI which is the most toxic form and provides the most conservative risk analysis.
(h) No Hanford site background pH values are available

Table 6: Potential Contaminants of Concern Screen: Surface Basin. (Sheet 1 of 2)

Data Usability					Screening Criteria Based on HSBRAM			
Analyte	Range	Qualifier for Max value	Blank Adjustment 5X Rule		Frequency of Detection	Background(a)	Risk-based screen(b)	Analyte Status
			Max Blank	Analyte Exceeds 5X Rule				
Radionuclides (All concentrations in pCi/g)								
Radium 226	0.56±0.096				1/1	0.506/0.844(c) 0.695±0.114(d)		Eliminated: Less than background
Thorium 228	1.00±0.084				1/1	0.461/1.35(e) 0.729±0.289(f)		Eliminated: Less than background
Inorganics (All concentrations in mg/kg)								
Aluminum	5730/8060		33.9	Yes	3/3	15600		Eliminated: Less than background
Chromium VI (g)	10.2/43.1				3/3	27.9	0.39	Retained for Ecological and Human Health analysis
Copper	11.4/18.7				3/3	28.2		Eliminated: Less than background
Iron	16300/23400		451	Yes	3/3	39160		Eliminated: Less than background
Lead	3.9/6.7		0.77	Yes	3/3	14.75		Eliminated: Less than background
Magnesium	3740/5210		7.3 B	Yes	3/3	8760		Eliminated: Less than background
Manganese	177/263		0.23 J	Yes	3/3	612		Eliminated: Less than background
Nickel	9.2/27.8				3/3	25.3	160	Retained for Ecological analysis
Zinc	50.5/554.0				3/3	79	2400	Retained for Ecological analysis

Table 6: Potential Contaminants of Concern Screen: Surface Basin. (Sheet 2 of 2)

Data Usability					Screening Criteria Based on HSRAM			
Analyte	Range	Qualifier for Max value	Blank Adjustment 5X Rule		Frequency of Detection	Background (a)	Risk-based screen(b)	Analyte Status
			Max Blank	Analyte Exceeds 5X Rule				
Anions (All concentrations in mg/kg)								
Nitrate/Nitrite	3.52/16.30	J			3/3	199		Eliminated: Less than background
Chloride	3.40/11.50	J	3.0 J	No	3/3	763		Eliminated based on 5 X Rule and less than background
Fluoride	0.70/1.40	J	0.2 J	Yes	3/3	12		Eliminated: Less than background
Phosphate	1.00/2.00	J			3/3	16		Eliminated: Less than background
Sulfate	23.00/95.00	J	3.0 J	Yes	3/3	1320		Eliminated: Less than background
pH	6.40/7.10				3/3	(h)		

J Qualifier indicates the associated numerical value is an estimated quantity. RAGS, 1989
5 X Rule: The sample results are positive if the site sample exceeds five times the maximum amount detected in any blank. RAGS, 1989
(a) Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes 95% UTL (DOE, April 1993)
(b) Indicates the most restrictive risk-based soil concentration and exposure pathway
(c) Minimum and maximum, and the mean values for Hanford site background concentrations of radium-226 (PNL 7346, Hanford Site Environmental Report, 1987-1992)
(d) The mean and standard deviation values for Hanford site background concentrations of radium-226 (PNL 7346, Hanford Site Environmental Report, 1987-1992)
(e) Minimum and maximum values for Hanford site background concentrations of thorium-228 (RCRA Closure Project, WHC-SD-DD-TI-075, Rev 0)
(f) The mean and standard deviation values for Hanford site background concentrations of thorium-228 (RCRA Closure Project, WHC-SD-DD-TI-075, Rev 0)
(g) All Chromium is assumed to be Chromium VI which is the most toxic form and provides the most conservative risk-based analysis
(h) No Hanford site background pH values are available

Table 7. Potential Contaminants of Concern Screen: Underground Pipes. (Sheet 1 of 2)

Data Usability					Screening Criteria Based on HSBRAM			
Analyte	Range	Qualifier for Max value	Blank Adjustment 5X Rule		Frequency of Detection	Background(a)	Risk-based screen(b)	Analyte Status
			Max Blank	Analyte Exceeds 5X Rule				
Inorganics (All concentrations in mg/kg)								
Aluminum	4070/6010		33.9	Yes	4/4	15600		Eliminated: Less than background
Chromium VI (d)	6.5/10.0				4/4	27.9		Eliminated: Less than background
Copper	9.7/10.7				3/4	28.2		Eliminated: Less than background
Iron	12900/20800		451	Yes	4/4	39160		Eliminated: Less than background
Lead	2.9/4.3		0.77	Yes	4/4	14.75		Eliminated: Less than background
Magnesium	3220/4410		7.3 B	Yes	4/4	8760		Eliminated: Less than background
Manganese	196/376		0.23 J	Yes	4/4	612		Eliminated: Less than background
Nickel	9.8/11.3		7.4 J	No	4/4	25.3		Eliminated based on 5 X Rule and less than background
Zinc	35.0/1070				4/4	79	2400	Retained for Ecological analysis
Zirconium	25.9				1/4	57.3		Eliminated: Less than background

Table 7. Potential Contaminants of Concern Screen: Underground Pipes. (Sheet 2 of 2)

Data Usability					Screening Criteria Based on HSBRAM			
Analyte	Range	Qualifier for Max value	Blank Adjustment 5X Rule		Frequency of Detection	Background(a)	Risk-based screen(b)	Analyte Status
			Max Blank	Analyte Exceeds 5X Rule				
Anions (All concentrations in mg/kg)								
Chloride	2.30/181.00	J	3.0 J	Yes	4/4	763		Eliminated: Less than background
Fluoride	1.40/2.50		0.2 J	Yes	4/4	12		Eliminated: Less than background
Phosphate	0.80/1.00	J			2/4	16		Eliminated: Less than background
Sulfate	4.00/329.00	J	3.0 J	Yes	4/4	1320		Eliminated: Less than background
pH	8.50/10.40				4/4	(c)		

B Reported value is less than the contract-required detection limit and greater than the instrument detection limit. RAGS, 1989

J Qualifier indicates the associated numerical value is an estimated quanitity. RAGS, 1989

5 X Rule: The sample results are positive if the site sample exceeds five times the maxiumum amount detected in any blank. RAGS, 1989

(a) Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes (DOE, April 1993)

(b) Indicates the most restrictive risk-based soil concentration

(c) No Hanford site background pH values are available

(d) All Chromium is assumed to be Chromium VI which is the most toxic form and provides the most conservative risk analysis.

Table 8. Surface Basin Preliminary Risk-Based Screen for Non-Radioactive Contaminants.

Contaminant	Inhalation Pathway				Oral Pathway			
	Carcinogenic Effects		Non-carcinogenic Effects		Carcinogenic effects		Non-carcinogenic effects	
	Inhalation SF $(mg/kg\text{-}d)^{-1}$	Soil Concentration at Inhalation ICR = 1E-07 (mg/kg)	Inhalation RfD (mg/kg-d)	Soil Concentration at Inhalation HQ = 0.1 (mg/kg)	Oral SF $(mg/kg\text{-}d)^{-1}$	Soil concentration at Oral ICR = 1E-07 (mg/kg)	Oral RfD (mg/kg-d)	Soil Concentration at Oral HQ = 0.1 (mg/kg)
Chromium VI(c)	42.0[a]	0.39	(b)		(b)		0.005[a]	40.0

[a]Integrated Risk Information System (IRIS, EPA 1993)
(b) No RfD or SF available to evaluate this pathway
(c) All Chromium is assumed to be Chromium VI which is the most toxic form and provides the most conservative risk analysis.
Shading indicates maximum concentration of contaminant exceeds the risk-based concentration

Table 9 : Human Health Risk Analysis for Pickling Acid Cribs and Surface Basin
Residential Scenario: Inhalation Exposure Pathway.

Waste Site	Contaminant	Maximum concentration	Intake	SF[a]	ICR[b]	RfD[c]	HQ[d]
West Crib	No COPCs identified						
East Crib	No COPCs identified						
Underground Pipes	No COPCs identified						
Surface Basin	Chromium VI[d]	43.1 mg/kg	2.6E-07 mg/kg-d	4.2E+01 $(mg/kg-d)^{-1}$	1E-05		
Total Risk					1E-05		

[a] SF - slope factor
[b] ICR - Lifetime incremental cancer risk
[c] There are no inhalation RfD (reference dose) values available to evaluate noncarcinogenic risk for this analyte
[d] Hazard Quotient
[e] All chromium is assumed to be chromium VI which is the most toxic form and provides the most conservative risk assessment analysis
Shading indicates that target human health risk of 1E-06 is exceeded

Table 10. Human Health Risk Analysis for Pickling Acid Crib
Residential Scenario: Ingestion Exposure Pathway.

Waste Site	Contaminant(s)	Maximum Concentration	Intake (mg/kg-d)	RfD[a] (mg/kg-d)	HQ[b]	SF[c] (mg/kg-d)-1	ICRd
West Crib	None identified						
East Crib	None identified						
Surface Basin	Chromium VI[f]	43.1 mg/kg	5.6E-04	.005	1E-01	(e)	
Underground Pipes	None identified						
Total Risk					1E-01		

[a]Reference dose
[b]Hazard quotient
[c]Slope factor
[d]Lifetime incremental cancer risk
(e) No SF available to evaluate this pathway
[f] All chromium is assumed to be chromium VI which is the most toxic form and provides the most conservative risk analysis.

DOE/RL-94-20
~~WHC Internal~~

DRAFT

ATTACHMENT 1

JOINT LETTER FROM REGULATORS

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

March 4, 1992

Mr. Steven H. Wisness
Hanford Project Manager
U.S. Department of Energy
P.O. Box, 550 A5-19
Richland, WA 99352

Re: Expedited Responses Action Planning Proposals and Implementation

Dear Mr. Wisness:

On January 22, 1992, a meeting was held to discuss the selection of new Expedited Response Actions (ERA). The Washington State Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA) assumed the task of identifying candidate sites for planning proposal preparation, and identification of lead regulatory agency.

The primary reasons to perform ERAs are to minimize or eliminate the potential for release of hazardous substances and/or radionuclides in the environment and to initiate actions consistent with anticipated remedy selections. The final remedy selection would be made after completion of a Remedial Investigation/Feasibility Study (RI/FS) or a RCRA Facility Investigation/ Corrective Measures Study (RFI/CMS).

On December 12, 1991, a meeting was held to discuss selection of new ERAs. In this meeting, the U.S. Department of Energy (DOE) and Westinghouse Hanford Company (WHC) provided EPA and Ecology with a list of twenty-two (22) candidate sites. In addition, DOE and WHC were seeking approval to proceed with EE/CA preparation for the 300 Area Burial Grounds. Based on this meeting and a continuing dialogue between Ecology, EPA, DOE, and WHC, four (4) sites from the candidate list have been selected for planning proposal preparation. In addition, we request DOE submit planning proposals for two additional sites that were drafted previously for DOE, but as yet have not been submitted to Ecology and EPA.

Ecology and EPA prefer to delay initiation of an ERA on the 300 Area Burial Grounds. With the use of test pits in both the liquid disposal sites and the burial grounds, it appears the schedule for completion of RI/FS activities in 300-FF-1 may be accelerated. In addition, treatability tests planned for this year may identify appropriate means for remediating contaminated sediments from the liquid disposal sites as well as the burial grounds. Early completion of these investigations could result in a final Record of Decision for the 300-FF-1 Operable Unit earlier than projected. Ecology and EPA prefer

this course of action because it would potentially eliminate the need to handle waste from the burial grounds twice (once as part of the ERA and again as part of the final remedy).

Ecology and EPA have selected the following four sites for planning proposal preparations:

Sodium Dichromate Barrel Disposal Landfill in 100-IU-4 Operable Unit

The sodium dichromate barrel disposal site in the 100-IU-4 Operable Unit was selected in part due because this is the only facility located within the 100-IU-4 Operable Unit. Also, early remedial action at this operable unit may abate the potential of more extensive environmental degradation. Any ground water contamination from the sodium dichromate barrel site would be addressed as part of the 100-HR-3 Operable Unit. Removal of drums and contaminated sediments from this site may completely remediate the 100-IU-4 Operable Unit or may result in a no further action record of decision. This ERA would be designated as an Ecology lead site due to its location within the 100-HR-3 ground water operable unit for which Ecology is also the lead regulatory agency. An ERA at the sodium dichromate barrel disposal site should not require extensive planning or characterization prior to initiation and therefore field work should begin in fiscal year 1992.

U.S. Bureau of Reclamation 2,4-D Burial Site in 100-IU-3 Operable Unit

The U.S. Bureau of Reclamation 2,4-D burial site in the 100-IU-3 Operable Unit was also selected in part because it is the only documented hazardous waste disposal area located north of the Columbia River on the Hanford Site. In addition, this site is one of the few waste sites where DOE does not control access. Removal of drums and contaminated sediments from this site could eliminate the primary source of hazardous waste from this part of the Hanford Site and enhance public safety. The north slope area of the Hanford Site has been of particular interest to Ecology due to public access and the existing lease agreement between DOE and the Washington State Department of Fish and Wildlife. Ecology would be designated lead regulatory agency for both this ERA and the 100-IU-3 Operable Unit.

White Bluffs Pickling Acid Crib in 100-IU-5 Operable Unit

The White Bluffs pickling acid crib in the 100-IU-5 Operable Unit represents a significant source of acidic metal waste solution. This waste was generated from the final cleaning of reactor cooling pipes prior to installation in Hanford's eight single-pass reactors. These liquid disposal sites are located approximately one mile west of the 100-F Area near the old White Bluffs town site. Again, this site represents the primary source of contamination within the 100-IU-5 Operable Unit and a removal action at this facility will likely limit

the need for and extensive investigation through an RI/FS. Since little is known about the extent of contamination associated with the White Bluffs pickling acid crib, some degree of characterization will likely be required as part of an ERA at this site. Due to its location upgradient of 100-F Area, EPA would be designated as lead regulatory agency for both this ERA and the 100-IU-5 Operable Unit.

100-IU-1 River Rail Wash Pit and 600 Area Army Munitions Burial Site

The 100-IU-1 operable unit contains two units. The riverland railroad car wash pit was decontaminated in 1963, and subsequently released from radiation zone status. Site records indicate that all items were removed from the munitions burial site in 1986. These sites are both located west of Highway 240 and lack the access controls present at nearly all other past practice sites at Hanford. EPA will be lead agency for this ERA and the 100-IU-1 Operable Unit. This presents the potential opportunity to reach a decision to take no further action at an operable unit after performing a confirmatory investigation. We expect that the entire investigation could be done as part of the ERA. If that is the case, the ERA would be followed by administrative steps to reach a final ROD.

Planning proposals for two additional sites are already drafted, but not released. These are for the 100 Area river outfall pipes and the 618-11 burial ground. These planning proposals should be transmitted to Ecology and EPA without delay. The regulatory lead agency will be identified for these proposals in the notice to proceed with EE/CA preparation.

Should you have any questions about the selection of candidate sites for planning proposal preparation or implementation, please contact either Steve Cross of Ecology (206) 459-6675 or Doug Sherwood of EPA (509) 376-9529.

Sincerely,

Paul T. Day
Hanford Project Manager
EPA Region 10

David B. Jansen, P.E.
Hanford Project Manager
Washington State
Department of Ecology

cc: T. Veneziano, WHC